PLUMBING I

COURSE DESCRIPTION

Plumbing I is **a course that will introduce students to basic skills and knowledge related to residential and light commercial plumbing. Topics covered include water distribution processes, installation of hot and cold water systems, and an introduction to drain, waste, vent systems in residential and commercial structures, cutting and fitting pipe, making joints, securing pipe, and roughing in. This course gives students an introduction to the skill and knowledge base typically required for apprentice plumbers.**

It is strongly recommended that administration and guidance follow the scope and sequence and course recommendations as listed.

Recommended: Construction Core
Algebra I

Recommended Credits: 1

Recommended Grade Level(s): **10th** 11th 12th

Number of Competencies in Course: 92

PLUMBING I

STANDARDS

1.0 Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community and workplace.

2.0 Students will assume responsibility for the safety of themselves, their coworkers, and bystanders.

3.0 Introduction to plumbing trades, history, responsibilities, characteristics, stages of progress of the plumbing profession.

4.0 Plumbing Safety—Unsafe acts and conditions: Demonstrate and understanding of the use and care of personal protective equipment, identify hazards specific to plumbers. Demonstrate the use of ladders, power and hand tools, trench safety, lockout/tagout.

5.0 Plumbing Tools: Identify basic hand and power tools and their use.

6.0 Plumbing Math: Add, subtract, multiply and divide whole numbers, fractions, decimals. Convert percentages and decimals to fractions. Convert fractions to decimals. Demonstrate the use of fittings and use common pipe measuring techniques.

7.0 Plumbing Drawings: Describe and identify all lines, signals, pipe schedule on a set of plumbing drawings. Describe information related to a set of plumbing drawings.

8.0 Plastic Pipe and Fittings: Identify materials and schedules for improper application of types of fittings, valves, hangers and how to measure, cut, and join plastic pipe.

9.0 CopperPpipe and Fittings: Identify types, schedules, properties of storage handling, types of fittings and valves, hanging and hangers for. Measure, ream, cut and join copper piping.

10.0 Cast Iron Pipe and Fittings: Proper and improper application of properties, storage, handling, materials and schedules for fittings, techniques for handling, measuring and cutting, joining cast iron pipes.

11.0 Carbon Steel Pipe and Fittings: Proper application of material, properties, storage, handling, hanging. Measure, cut, groove, thread, and join carbon steel piping.

12.0 Corrugated Stainless Steel Tubing: Identify manufacturers of proper and improper application of hanging and supporting. Measure, cut, join and grove corrugated stainless steel.

13.0 Fixtures and Faucets: Identify types of materials used. Identify types of sinks, lavatories, faucets, bath tubs, bath-shower modules, shower stalls, shower baths, toilets, urinals, bidets, drinking fountains, coolers.

14.0 Introduction to Drain, Waste, and Vent Systems: Explain how waste moves through the system. Composition of a drainage system. Explain the importance of the DWV system. Identify types of drain waste and vent systems and their applications. Identify code and health issue violations and consequences related to DWV system.

15.0 Introduction to Water Distribution Systems: Describe municipal, residential, and private water systems, their major distribution systems. Relationships between components of a water distribution system.

PLUMBING I

STANDARD 1.0

Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

LEARNING EXPECTATIONS

The student will:

1.1 Cultivate leadership skills.
1.2 Participate in SkillsUSA as an integral part of instruction.
1.3 Assess situations within the school, community, and workplace and apply values to develop and select solutions.
1.4 Demonstrate the ability to work cooperatively with others.
1.5 Exhibit integrity and pride in the practice and quality of work.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

1.1A Takes initiative in meetings to actively influence the results of deliberations.
1.1B Uses critical-thinking and consensus building skills in group deliberations.
1.1C Exhibits integrity and pride in the practice and quality of work
1.2A Applies high ethical standards to personal, community, and professional situations.
1.2B Participates and conducts meetings according to accepted rules of parliamentary procedure.
1.3A Analyzes simulated workplace situations and uses problem-solving and critical-thinking techniques to suggest solutions the problem.
1.3B Analyzes socio-economic conflicts associated with the construction industry and applies values to evaluate possible ways to mitigate the conflicts.
1.4A Participates in a committee.
1.4B Contributes to a group project.
1.5 Exhibits integrity and pride in the practice and quality of work.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Create a leadership inventory and use it to conduct a personal assessment.
- Participate in various SkillsUSA or similar programs and/or competitive events.
- Evaluate a civic project within the school, community, and/or workplace and evaluate the expected long term effects of the project.
- Prepare a meeting agenda for a school or a community meeting.
- Attend the meeting of a professional organization.
- Participate in a design team to complete an assigned project.

INTEGRATION LINKAGES

SkillsUSA *Professional Development Program (PDP);* SkillsUSA; Communication and Writing Skills; Teambuilding Skills; Research; Language Arts; Sociology; Psychology; Algebra; Geometry; English; Social Studies; Problem Solving; Interpersonal Skills; Employability Skills; Critical-Thinking Skills; MAVCC; SCANS (Secretary's Commission on Achieving Necessary Skills); Chamber of Commerce; Colleges; Universities; Technology Centers; Plumbing, Heating, and Cooling Contractors (PHCC)

PLUMBING I

STANDARD 2.0

Students will assume responsibility for the safety of themselves, their coworkers, and bystanders.

LEARNING EXPECTATIONS

The student will:

2.1 Demonstrate a positive attitude regarding safety practices and issues.
2.2 Use and inspect personal protective equipment.
2.3 Inspect, maintain, and employ safe operating procedures with tools and equipment, such as hand and power tools, ladders, scaffolding, and lifting equipment.
2.4 Demonstrate continuous awareness of potential hazards to self and others and respond appropriately.
2.5 Assume responsibilities under HazCom (Hazard Communication) regulations.
2.6 Adhere to responsibilities, regulations, and Occupational Safety & Health Administration (OSHA) policies to protect coworkers and bystanders from hazards.
2.7 Adhere to responsibilities, regulations, and Occupational Safety & Health Administration (OSHA) policies regarding reporting of accidents and observed hazards and regarding emergency response procedures.
2.8 Demonstrate appropriate related safety procedures.
2.9 Pass with 100 % accuracy a written examination relating to safety issues.
2.10 Pass with 100% accuracy a performance examination relating to safety.
2.11 Maintain a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

2.1A Is attentive during safety discussions.
2.1B Actively seeks information about safe procedures.
2.1C Responds positively to instruction, advice, and correction regarding safety issues.
2.1D Does not deliberately create or increase hazards, such as by horseplay, practical jokes, or creating distractions.
2.1E Reports to school or work physically ready to perform to professional standards, such as rested, or not impaired by medications, drugs, alcohol, etc.
2.2 Selects, inspects, and uses the correct personal protective equipment for the assigned task.
2.3A Inspects power tools for intact guards, shields, insulation, and other protective devices.
2.3B Inspects extension cords for the presence of a functional ground connection, prior to use.
2.3C Operates and maintains tools in accordance with manufacturer's instructions and as required by regulation or company policy.
2.3D Properly places and secures ladders and scaffolding prior to use.
2.4A Is observant of personnel and activities in the vicinity of the work area.
2.4B Warns nearby personnel prior to starting potentially hazardous actions.
2.5A When asked to use a new hazardous material, retrieves MSDSs (material safety data sheets) and identifies the health hazards associated with the new material.
2.5B Reports hazards found on the job site to the supervisor.
2.6A Erects shields, barriers, and signage to protect coworkers and bystanders prior to starting potentially hazardous tasks.
2.6B Provides and activates adequate ventilation equipment as required by the task.
2.7A Reports all injuries to self to the immediate supervisor.

2.7B Reports observed unguarded hazards to their immediate supervisor.
2.8 Complies with personal assignments regarding emergency assignments.
2.9 Passes with 100 % accuracy a written examination relating to safety issues.
2.10 Passes with 100% accuracy a performance examination relating to safety.
2.11 Maintains a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Conduct a practice drill simulating a hazardous solvent spill in which an emergency action plan is to be implemented.
- Instruct a visitor to obviously approach the vicinity of a student conducting a hazardous activity and note the level of awareness demonstrated by the student.
- For a project requiring the use of ladders and/or scaffolding, note the proper placement and securing procedures followed by students.

INTEGRATION/LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Algebra; Geometry Communication Skills; Leadership Skills; Teamwork Skills; Secretary's Commission on Achieving Necessary Skills (SCANS); SkillsUSA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing Heating and Cooling Contractors (PHCC); Power Tool Institute (PTI)

PLUMBING I

STANDARD 3.0

Introduction to plumbing trades, history, responsibilities, characteristics, stages of progress of the plumbing profession.

LEARNING EXPECTATIONS

The student will:

3.1 Describe the history of the plumbing profession.
3.2 Identify the responsibilities of a person working in the construction industry.
3.3 State the personal characteristics of a professional.
3.4 Identify the stages of progress within the plumbing profession and its positive impact on society.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:
This is a knowledge based module and a written test with a passing score will indicate student has met all learning expectations.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- **Have a professional plumber come to class and talk with students about what is expected of them on the job.**
- **Have students search the internet and find job openings for plumbers with salary comparisons.**

INTEGRATION/LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Algebra; Geometry; Communication Skills; Leadership Skills; Teamwork Skills; English; Secretary's Commission on Achieving Necessary Skills (SCANS); SkillsUSA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing Heating and Cooling Contractors (PHCC); Power Tool Institute (PTI)

PLUMBING I

STANDARD 4.0

Plumbing Safety—Unsafe acts and conditions: Demonstrate and understanding of the use and care of personal protective equipment, identify hazards specific to plumbers. Demonstrate the use of ladders, power and hand tools, trench safety, lockout/tagout.

LEARNING EXPECTATIONS

The student will:

4.1 Demonstrate the use and care of appropriate personal protective equipment.
4.2 Demonstrate the proper use of ladders.
4.3 Demonstrate how to maintain power tools safely.
4.4 Describe and demonstrate the lockout/tagout process.
4.5 Describe the common unsafe acts and unsafe conditions that cause accidents.
4.6 Describe to handle unsafe acts and conditions.
4.7 Explain how the cost of accidents and illnesses affects everyone on site.
4.8 Identify job-site hazardous work specific to plumbers.
4.9 Explain how to work safely in and around a trench.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

4.1A Inspects the following personal protective equipment:
- Gloves
- Body harness
- Hard hat
- Safety glasses
- Safety shoes
- Hearing protection

4.1B Puts on the following personal protective equipment:
- Hard hat
- Body harness
- Respiratory protection
- Eye protection

4.2A Demonstrates proper use of ladders.

4.3A Inspects the following power tools to ensure they are safe to use:
- Demolition saw
- Skill saw
- Reciprocating saw
- Power drill

4.4A Demonstrates/simulates the proper method of lockout/tagout.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- **Students need to practice and repeat all safety procedures**

INTEGRATION/LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Algebra; Geometry; Communication Skills; Leadership Skills; Teamwork Skills; English; Secretary's Commission on Achieving Necessary Skills (SCANS); SkillsUSA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing, Heating, and Cooling Contractors (PHCC)

PLUMBING I

STANDARD 5.0

Plumbing Tools: Identify basic hand and power tools and their use.

LEARNING EXPECTATIONS

The student will:

5.1 Identify the basic hand and power tools used in the plumbing trade.
5.2 Demonstrate the proper maintenance for caring for hand and power tools.
5.3 Demonstrate the proper use of plumbing tools.
5.4 Demonstrate the ability to know when and how to select to proper tool(s) for tasks.
5.5 Demonstrate how to prepare a surface for tool use.
5.6 Describe the safety requirements for using plumbing tools.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

5.1A Identifies basic measuring, layout and cutting tools.
5.1B Identifies basic drilling, boring, and reaming tools.
5.1C Identifies hammers, screwdrivers, and vises introduced in this module.
5.2 Explains some of the basic care and maintenance procedures identified in this module.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Have students do small project which requires them to use all the basic hand tools.

INTEGRATION LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Algebra; Geometry; Communication Skills; Leadership Skills; Teamwork Skills; English; Secretary's Commission on Achieving Necessary Skills (SCANS); Skills USA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing, Heating, and Cooling Contractors (PHCC)

PLUMBING I

STANDARD 6.0

Plumbing Math: Add, subtract, multiply and divide whole numbers, fractions, decimals. Convert percentages and decimals to fractions. Convert fractions to decimals. Demonstrate the use of fittings and use common pipe measuring techniques.

LEARNING EXPECTATIONS

The student will:

6.1 Calculate end-to-end measurements using fitting allowances and thread makeup.
6.2 Use fitting dimension tables to determine fitting allowances and thread makeup.
6.3 Identify the parts of a fitting and common use pipe-measuring techniques.
6.4 Add, subtract, multiply and divide whole numbers, fractions and decimals.
6.5 Convert decimals to percentages and percentages to decimals.
6.6 Convert fractions to decimals and decimals to fractions.
6.7 Explain what the metric system is and how it is important in the plumbing trade.
6.8 Square various numbers and takes square roots of numbers, with and without a calculator.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

6.1 Measures pipe using the following methods:
- End-to-end
- End-to-center
- Center-to-center
- End-to-face
- Face-to-face
- Face-to-throat

6.2 Determines end-to-end dimensions by figuring fitting allowances and thread makeup.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- **Using worksheets and actual pieces of pipe have students practice measure.**

INTEGRATION/LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Algebra; Geometry; Communication Skills; Leadership Skills; Teamwork Skills; English; Secretary's Commission on Achieving Necessary Skills (SCANS); Skills USA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing, Heating, and Cooling Contractors (PHCC)

PLUMBING I

STANDARD 7.0

Plumbing Drawings: Describe and identify all lines, signals, pipe schedule on a set of plumbing drawings. Describe information related to a set of plumbing drawings.

LEARNING EXPECTATIONS

The student will:

7.1 Interpret plumbing-related information from a set of plumbing drawings.
7.2 Identify the basic symbols used in schematic drawings of pipe assemblies.
7.3 Sketch orthographic and schematic drawings.
7.4 Discuss how code requirements apply to certain drawings.
7.5 Identify pictorial (isometric and oblique), schematic, and orthographic drawings, and discuss how different views are used to depict information about objects.
7.6 Explain the types of drawings that may be included in a set of plumbing drawings and the relationship among the different drawings.
7.7 Use an architect's scale to draw lines to scale and to measure lines drawn to scale.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

7.1 Interprets and explains information from given drawings.
7.2 Obtains information about piping systems from the set of drawings provided with this module.
7.3 Makes isometric sketches from other drawings.
7.4 Explains the relationship among drawings, specifications, and the local plumbing code.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Working from actual blueprints, have students identify areas that pertain to plumbing.
- Have students trace the plumbing plan for your school.
- Have plumbing contractor or estimator come to your classroom and go over a set of plans.

INTEGRATION/LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Algebra; Geometry; Communication Skills; Leadership Skills; Teamwork Skills; English; Secretary's Commission on Achieving Necessary Skills (SCANS); SkillsUSA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing, Heating, and Cooling Contractors (PHCC)

PLUMBING I

STANDARD 8.0

Plastic Pipe and Fittings: Identify materials and schedules for improper application of types of fittings, valves, hangers and how to measure, cut, and join plastic pipe.

LEARNING EXPECTATIONS

The student will:

8.1 Identify types of materials and schedules of plastic piping.
8.2 Identify types of fittings and valves used with plastic piping.
8.3 Explain proper procedures for the handling, storage, and protection of plastic pipes.
8.4 Properly measure, cut, and join plastic piping.
8.5 Identify and determine the kinds of hangers and supports needed for plastic piping.
8.6 Identify various techniques used in hanging and supporting plastic piping.
8.7 Identify proper and improper applications of plastic piping.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

8.1 Selects correct types of materials for plastic piping systems.
8.2 Identifies types of fittings and valves and their uses.
8.3 Selects the appropriate personal protective equipment for working with plastic piping.
8.4 Properly measures, cuts, and joins plastic piping.
8.5 Selects the correct hanger or support for the application.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- **Have plumbing supply house come in and bring samples of plastic pipe, fittings, and adhesives.**
- **Have each student follow a drawing that requires them to cut and join plastic pipe.**

INTEGRATION/LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Algebra; Geometry; Communication Skills; Leadership Skills; Teamwork Skills; English; Secretary's Commission on Achieving Necessary Skills (SCANS); SkillsUSA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing, Heating, and Cooling Contractors (PHCC)

PLUMBING I

STANDARD 9.0

Copper Pipe and Fittings: Identify types, schedules, properties of storage handling, types of fittings and valves, hanging and hangers for. Measure, ream, cut, and join copper piping.

LEARNING EXPECTATIONS

The student will:

9.1 Identify the types of materials and schedules used with copper piping.
9.2 Identify the types of fittings and valves used with copper piping.
9.3 Identify the hazards and safety precautions associated with copper piping.
9.4 Properly measure, ream, cut and join copper piping.
9.5 Identify the techniques used in hanging and supporting copper piping.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

9.1 Selects correct types of materials for copper piping systems.
9.2 Identifies types of fittings and valves and their uses.
9.3 Selects the appropriate personal protective equipment for working with copper piping.
9.4 Correctly measures, reams, cuts, and joins copper piping.
9.5 Selects the correct hanger or support for the application.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- **Because of the expense of copper pipe, try to get either a supply house or a plumbing contractor to donate extra pipe and fittings they may have. Use these materials to cut pipe and join them.**
- **Using a measured drawing, students will cut and join pipe.**

INTEGRATION/LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Algebra; Geometry; Communication Skills; Leadership Skills; Teamwork Skills; English; Secretary's Commission on Achieving Necessary Skills (SCANS); SkillsUSA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing, Heating, and Cooling Contractors (PHCC); Power Tool Institute (PTI)

PLUMBING I

STANDARD 10.0

Cast Iron Pipe and Fittings: Proper and improper application of properties, storage, handling, materials and schedules for fitting, techniques for handling, measuring and cutting, joining cast iron pipes.

LEARNING EXPECTATIONS

The student will:
10.1 Recognize proper and improper applications of cast-iron piping.
10.2 Identify the types of fittings used with cast-iron piping.
10.3 Identify the hazards and safety precautions associated with cast-iron piping.
10.4 Properly measure, cut, and join cast-iron piping.
10.5 Identify the various techniques used in handling and supporting cast-iron piping.
10.6 Identify the material properties, storage, and handling requirements of cast-iron piping.
10.7 Identify the types of materials and schedules in cast-iron piping.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:
10.1 Selects the correct materials for cast-iron piping systems.
10.2 Identifies types of fittings and their uses.
10.3 Selects the appropriate personal protective equipment for cast-iron piping.
10.4 Correctly measures, cuts, and joins cast-iron piping.
10.5 Selects the correct hanger or support and spacing for the application.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- **Because of the expense of cast iron pipe, have a local supplier or contractor come demonstrate the proper cutting and joining.**

INTEGRATION/LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Algebra; Geometry; Communication Skills; Leadership Skills; Teamwork Skills; English; Secretary's Commission on Achieving Necessary Skills (SCANS); SkillsUSA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing, Heating, and Cooling Contractors (PHCC)

PLUMBING I

STANDARD 11.0

Carbon Steel Pipe and Fittings: Proper application of material, properties, storage, handling, hanging. Measure, cut, groove, thread, and join carbon steel.

LEARNING EXPECTATIONS

The student will:

11.1 Recognize proper applications of carbon steel piping.
11.2 Identify the material properties, storage, and handling requirements of carbon steel piping.
11.3 Properly measure, cut, groove, thread and join carbon steel piping.
11.4 Identify the various techniques used in hanging and supporting carbon steel piping.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

11.1A Identifies the common types of materials, schedules, sizes, and labels used for carbon steel piping.
11.1B Identifies the common fittings and valves used with carbon steel piping.
11.2 Identifies the hazards and safety precautions associated with carbon steel piping.
11.3 Properly measures, cuts, grooves, and joins carbon steel piping.
11.4A Identifies the various techniques used in hanging and supporting carbon steel piping.
11.4B Properly installs appropriate hangers and clamps onto masonry.
11.4C Properly installs appropriate hangers and clamps onto concrete.
11.4D Properly installs appropriate hangers and clamps onto steel.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- **This another sample where it would benefit the instructor to have a local supplier to come in an demonstrate these type of application.**

INTEGRATION/LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Algebra; Geometry; Communication Skills; Leadership Skills; Teamwork Skills; English; Secretary's Commission on Achieving Necessary Skills (SCANS); SkillsUSA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing, Heating, and Cooling Contractors (PHCC)

PLUMBING I

STANDARD 12.0

Corrugated Stainless Steel Tubing: Identify manufacturers of proper and improper application of hanging and supporting. Measure, cut, join, and grove corrugated stainless steel.

LEARNING EXPECTATIONS

The student will:

12.1 Explain how to properly measure, cut, join, and groove corrugated stainless steel tubing.
12.2 Identify the common manufacturers of corrugated stainless steel tubing.
12.3 Recognize proper and improper applications of corrugated stainless steel tubing.
12.4 Identify various techniques used in hanging and supporting corrugated stainless steel tubing.
12.5 Identify material properties, storage, and handling requirements of corrugated stainless steel tubing.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:
12.1 Simulates and/or demonstrates how to join corrugated stainless steel tubing.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Instructor demonstration.

INTEGRATION/LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Communication Skills; Leadership Skills; Teamwork Skills; English; Secretary's Commission on Achieving Necessary Skills (SCANS); SkillsUSA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing Heating and Cooling Contractors (PHCC)

PLUMBING I

STANDARD 13.0

Fixtures and Faucets: Identify types of materials used. Identify types of sinks, lavatories, faucets, bath tubs, bath-shower modules, shower stalls, shower baths, toilets, urinals, bidets, drinking fountains, coolers.

LEARNING EXPECTATIONS

The student will:

13.1 Discuss common types of sinks, lavatories, and faucets.
13.2 Identify the basic types of materials used in the manufacture of plumbing fixtures.
13.3 Identify and discuss common types of bathtubs, bath-shower modules, shower stalls, and shower baths.
13.4 Discuss common types of toilets, urinals, and bidets.
13.5 Identify and describe common types of drinking fountains and water coolers.
13.6 Discuss common types of garbage disposals and domestic dishwashers.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

13.1 Identifies the most commonly installed lavatories, tubs, sinks, and toilets.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Using plumbing supply catalogs, students will choose types of fixtures they might use in a mock plumbing project.

INTEGRATION/LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Communication Skills; Leadership Skills; Teamwork Skills; English; Secretary's Commission on Achieving Necessary Skills (SCANS); SkillsUSA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing Heating and Cooling Contractors (PHCC).

PLUMBING I

STANDARD 14.0

Introduction to Drain, Waste and Vent Systems: Explain how waste moves through the system. Composition of a drainage system. Explain the importance of the DWV system. Identify types of drain, waste, and vent systems and their applications. Identify code and health issue violations and consequences related to DWV system.

LEARNING EXPECTATIONS

The student will:

14.1 Identify the various types of drain, waste, and vent (DWV) fittings and describe their applications.

14.2 Identify the major components of a drainage system and describe their functions.

14.3 Identify the different types if traps and their components, explain the importance of traps, and identify the ways the traps can lose their seals.

14.4 Explain how waste moves from a fixture through the drain system to the environment.

14.5 Identify significant code and health issues, violations, and consequences related to DWV systems.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

14.1 Sketches a simple DWV system, labels its components, and sizes the types.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Using a mock wall built by students, students will install a DWV system. Do not join the pipe in order to use materials over and over again.

INTEGRATION/LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Communication Skills; Leadership Skills; Teamwork Skills; English; Secretary's Commission on Achieving Necessary Skills (SCANS); SkillsUSA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing Heating and Cooling Contractors (PHCC)

PLUMBING I

STANDARD 15.0

Introduction to Water Distribution Systems: Describe municipal, residential, and private water systems, their major distribution systems. Relationships between components of a water distribution system.

LEARNING EXPECTATIONS

The student will:

15.1 Identify the major components of a water distribution system and describe the function of each component.

15.2 Describe the process in which water is distributed in municipal, residential, and private water systems.

15.3 Explain the relationships between components of a water distribution system.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

15.1 Identifies the major components of a water distribution system and describe the function of each component.

SAMPLE PERFORMANCE TASKS

These are sample projects of the type and scale recommended to address one or more of the learning expectations for this standard. Other projects can be used at the instructor's discretion.

- Have students do a research paper with diagrams.
- Have students pick one dimension of these types of systems and draw a diagram explaining its function in the over all system.

INTEGRATION/LINKAGES

Science; Computer Skills; Research and Writing Skills; Language Arts; Communication Skills; Leadership Skills; Teamwork Skills; English; Secretary's Commission on Achieving Necessary Skills (SCANS); SkillsUSA; Associated Builders and Contractors (ABC); Associated General Contractors (AGC); MAVCC; National Center for Construction Education and Research (NCCER); Occupational Safety and Health Administration (OSHA); Environmental Protection Agency; United States Department of Labor; Tennessee Department of Labor and Workforce Development; Plumbing Heating and Cooling Contractors (PHCC)

PLUMBING I

SAMPLING OF AVAILABLE RESOURCES

- *Core Curriculum*, National Center for Construction Education and Research (NCCER), Prentice Hall, Upper Saddle River, NJ; ©2000. Also known as the ‘‘Wheels of Learning’’ materials.
- *Plumbing Level One*, National Center for Construction Education and Research (NCCER), Prentice Hall, Upper Saddle River, NJ; ©2000. Also known as the ‘‘Wheels of Learning’’ materials.
- *Plumbing Level Two*, National Center for Construction Education and Research (NCCER), Prentice Hall, Upper Saddle River, NJ; ©2001. Also known as the ‘‘Wheels of Learning’’ materials.
- *Plumbing Level Three*, National Center for Construction Education and Research (NCCER), Prentice Hall, Upper Saddle River, NJ; ©1993. Also known as the ‘‘Wheels of Learning’’ materials.
- *Plumbing Level Four*, National Center for Construction Education and Research (NCCER), Prentice Hall, Upper Saddle River, NJ; ©1993. Also known as the ‘‘Wheels of Learning’’ materials.
- *Oxyacetylene Welding and Oxyfuel Cutting 3rd Edition,* MAVCC, Oklahoma Department of Vocational and Technical Education ©2004
- *Introduction to Plumbing*, MAVCC, Oklahoma Department of Vocational and Technical Education
- *Residential Plumbing,* MAVCC, Oklahoma Department of Vocational and Technical Education ©1998
- *Fundamentals of Construction,* MAVCC, Oklahoma Department of Vocational and Technical Education
- *Basic Drafting*, MAVCC, Oklahoma Department of Vocational and Technical Education
- *Modern Plumbing,* Goodheart-Willcox Company Inc. Tinley Park, IL. ©2005
- *Print Reading for Construction,* Walter C. Brown and Daniel P Dorfmueller, Goodheart-Willcox, © 2005
- *Total Quality Curriculum*, National SkillsUSA
- *Professional Development Program* (PDP), National SkillsUSA—www.vica.org
- Plumbing-Heating-Cooling-Contractors (PHCC), www.phccweb.org

- United States Department of Labor, www.dol.gov
- United States Department of Labor, Occupational Outlook Handbook, www.dol.gov (link)
- Secretary's Commission on Achieving Necessary Skills, www.dol.gov (link)
- Occupational Safety and Health Administration (OSHA), www.osha.gov
- Environmental Protection Agency (EPA), www.epa.gov
- National Safety Council, www.nsc.org
- National Skills Standards Board Institute, www.nssb.org
- Vocational Information Center, www.khake.com
- Power Tool Institute (PTI), www.powertoolinstitute.com
- Associated Builders and Contractors, www.abc.org
- Associated General Contractors of America, www.agcofamerica.org
- Building Officials and Code Administration International, www.bocai.org